



The Best Practice In Calculating Employee Emissions and Environmental Impact

Summary Report

Acme - Fairfax Office Employee Commute Survey and Emissions Analysis

DULLES AREA TRANSPORTATION ASSOCIATION
March 6, 2016



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Background

Between September 17th and September 30th, 2015, employees at Acme, participated in a survey to ascertain how they travel to and from work. The results of this survey are summarized in this report, and were used as input to E³Calc, a calculator that analyzes the employee commute information to: 1) establish a baseline for the amount of CO₂ that is emitted as a result of employee commutes; 2) determines the impact that non-single occupant vehicle travel has on the businesses CO₂ emissions; and 3) allows for comparisons to a situation where everyone at the site drove alone to work, or to an average business in the locality in which the business is located. Overall, E³Calc allows a business to analyze the impact that transportation demand management (TDM) strategies have in reducing the carbon footprint of office locations and will assist management in determining the appropriate mix of new TDM related programs to facilitate further reductions in vehicle miles traveled (VMT).

For this summary, the employee survey data was analyzed in E³Calc and compared to what the carbon footprint would be at each location if all employees drove to work alone in a vehicle as well as that of a typical business of the same size (550 employees) located in Fairfax County. The results are summarized below.

Employee Survey Highlights

Summary of Employee Commuting Modes

- DATA collected responses from just over 42.54% (234 responses) of the 550 employees located at the Fairfax Acme site.
- Two percent of Acme's employees who were surveyed reported regularly using telework. A typical business of the same size in Fairfax County has about 6% of its employees regularly teleworking.
- More than nine out of ten (92%) of the Acme's employees surveyed drive alone to work. A typical business of the same size in Fairfax has 84% of their employees who drive to work alone.
- The average Acme employee commutes 16.4 miles a day (one-way), which is slightly farther than the average Fairfax based employee who commutes about 16.1 miles a day (one-way).
- The average Acme employee spends 39 minutes commuting each day (one way), slightly higher than the 34 minutes that a most Fairfax employees commute;
- The shortest employee commute is 3 minutes;



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- The shortest employee commuting distance is .8 of a mile, the longest is 135 miles (one way) – if commuting 270 miles every workday, this employee would drive 70,200 miles each year just to get to and from work;
- The longest employee commute is 160 minutes. That equates to more than 5 hours of commuting each day, or 25 hours/week; 1300 hours/year - or 54.1 days of commuting annually (almost 14.8% of a year's worth of days);
- Three percent of Acme employees carpool, with an average of 2 riders who drive about 13.5 miles to their meeting point;
- Current daily trips to the Fairfax site are about 1,035 – those employees who choose not to drive alone each day are eliminating about 65 trips a day (6% reduction) in comparison if everyone drove alone to the site;
- 9 out of 10 employees commute to work during the morning rush hour (6:30 – 9:30 a.m.);
- Four percent of Acme employees drive hybrid vehicles;
- One in four (25%) of those surveyed drive compact or economy vehicles;
- Twenty-nine percent of employees drive SUVs.

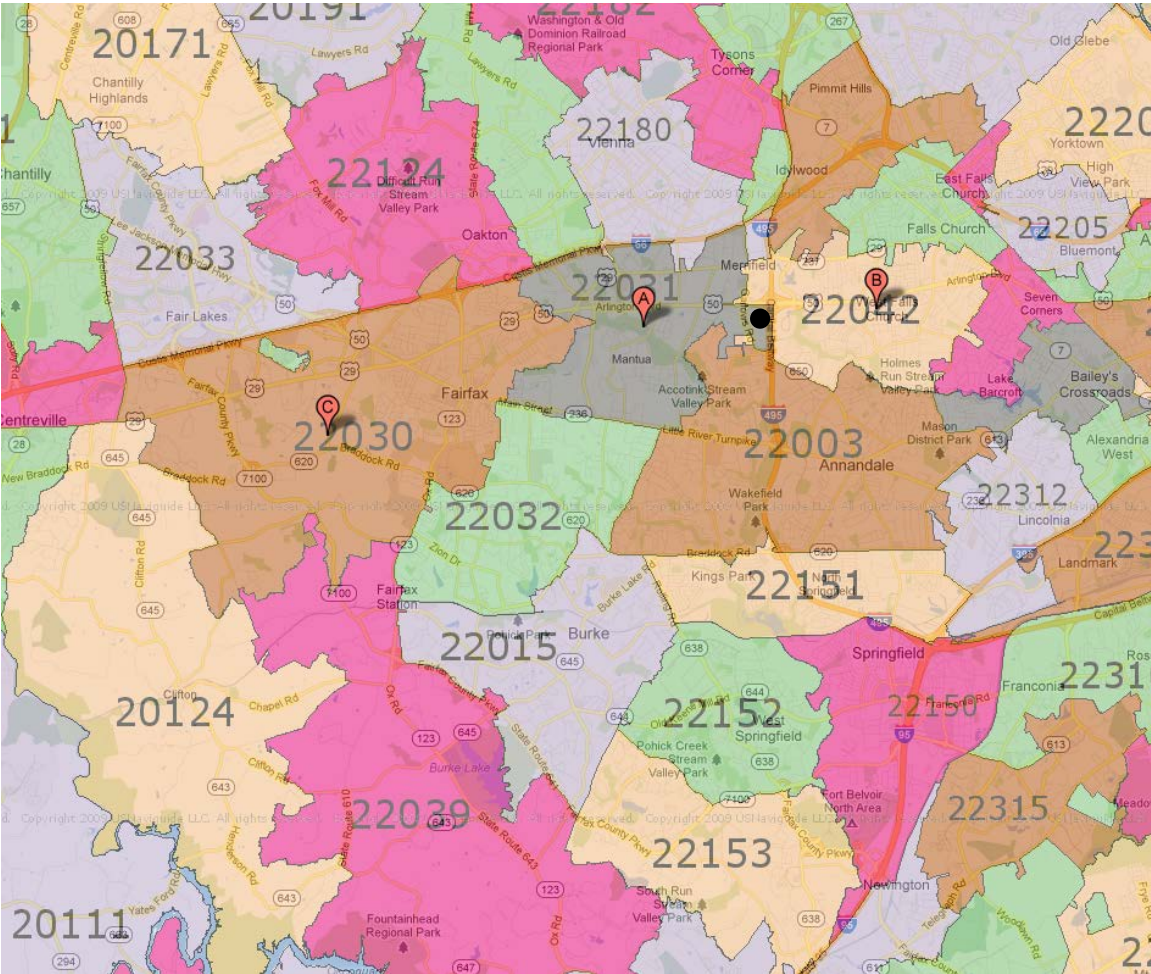
Emissions Analysis Highlights

- Current daily commute miles driven by Acme employees is about 17,000 miles, creating emissions from employee commutes of 21,182 pounds of CO₂ to the region's atmosphere daily, which is approximately 6% less than if all employees drove alone to work everyday.
- Compared to a scenario where all employees drove alone, the current commuting patterns at the Acme's Fairfax office site reduce total daily vehicle trips by 65 trips (removing 32 cars from local roads daily) and reduce daily vehicle miles traveled (VMT) by 1,062 miles per day. Annually, that reduces daily vehicle trips by 16,158 and VMT by 265,429 miles.



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Most Common Employee Zip Code Locations



Office Location ●

Map Code	Zipcode	# Employees
A	22031	12
B	22042	10
C	22030	9



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Results - For your COMPANY and A TYPICAL WORKSITE of Your Size in Region/County

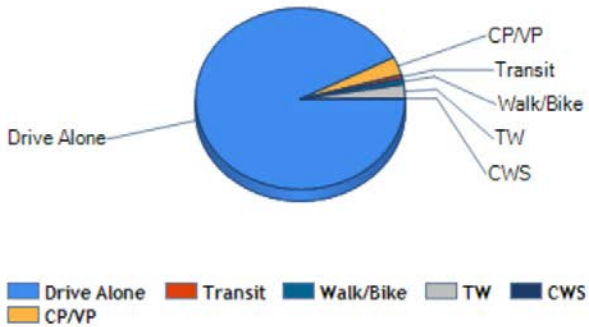
1 How many employees work at your work location? 550

2a What types of transportation do your employees use to travel to work location?

Drive alone	92%
Carpool or vanpool	3%
Ride a bus, train, subway	1%
Walk or bicycle	1%
Telework	2%
Compressed schedule days	0%
Total*	100%

* May not add to 100% due to rounding.

Types of Transportation Used (Your Company)

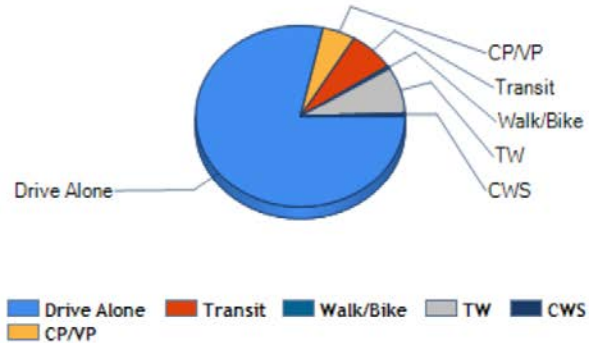


2b What types of transportation do typical worksite employees use to travel to work location?

Drive alone	78%
Carpool or vanpool	5%
Ride a bus, train, subway	7%
Walk or bicycle	1%
Telework	8%
Compressed schedule days	1%
Total*	100%

* May not add to 100% due to rounding.

Types of Transportation Used (Region)





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Employee Commuting Characteristics

3	Average number of riders in carpools/vanpools	Your Company	Region Estimate
		2.0	2.5
4	How do typical worksite employees who use carpool/vanpool or transit get to the pool meeting point or the transit stop/station?	Your Company	Region Estimate
	Percentage of typical worksite employees who drive alone to the meeting point	38%	14%
	Average distance to the meeting point (miles)	13.5	3.8
5	How far do typical worksite employees travel from home to work?	Your Company	Region Estimate
	Average commute distance (miles)	16.4	15.7
6	How long does it take typical worksite employees to travel to work?	Your Company	Region Estimate
	Average commute time (minutes)	39	36
7	How much commute time do typical worksite employees spend in congested traffic?	Your Company	Region Estimate
	Average percentage of commute at less than 35 mph	53%	45%
8	What percentage of typical worksite employees travel to work during the morning rush hour?	Your Company	Region Estimate
	Percentage of typical worksite employees who arrive at work between 6:30am and 9:30am	91%	76%



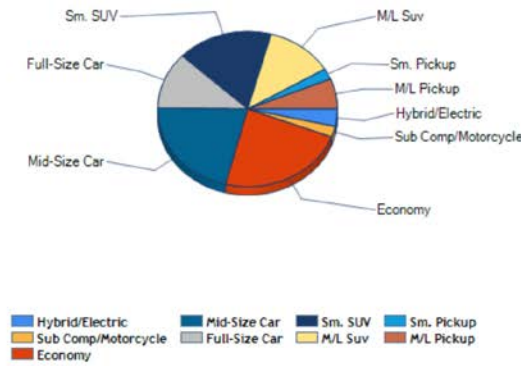
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Types of Vehicles Used To Commute

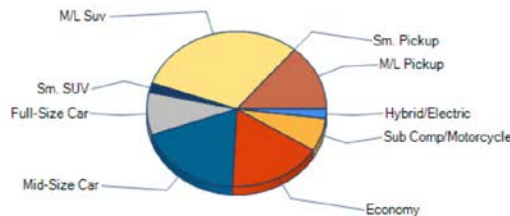
9	What types of vehicles do typical worksite employees who drive use for commuting?	Your Company	Region Estimate
	Percentages of typical worksite employees who use the following vehicle types to get to work		
	Hybrid/Electric	4%	2%
	Subcompact car/Motorcycle	2%	7%
	Economy car	23%	17%
	Mid-size car	21%	19%
	Full-size car	12%	9%
	Small SUV or van	17%	2%
	Medium to large SUV or van	12%	31%
	Small pick-up truck	2%	0%
	Medium to large pick-up truck	6%	14%
	Total*	100%	101%

* May not add to 100% due to rounding.

Types of Vehicles Driven to Work (Your Company)



Types of Vehicles Driven to Work (Region)





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10 Estimated average fuel economy (mpg)

Average miles per gallon of employees' vehicles 24.0

11 Importance of economic reasons for making change:

Very Important 28%
 Somewhat Important 41%
 Not at All Important 30%
 Prefer not to answer 1%

12 Importance of environmental reasons for making change:

Very Important 15%
 Somewhat Important 43%
 Not at All Important 38%
 Prefer not to answer 5%

13 Would the services below encourage alternate mode use? (Percentages are read across the row.)

Commuting Service	Yes	Maybe	No	Use Now
1 Assistance to form a carpool/vanpool	8%	24%	66%	3%
2 Free parking for carpools/vanpools	1%	13%	82%	4%
3 Monthly subsidy for vanpools	9%	24%	67%	0%
4 Monthly subsidy for transit	16%	17%	66%	0%
5 Route/schedule information for transit	5%	14%	79%	1%
6 Ride in case of emergency for carpool, vanpool, transit	11%	24%	63%	1%
7 Secure locker or other storage for bicycle	8%	11%	80%	1%



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14 How much do you pay for for transit, carpool, vanpool, bicycling, or walking commuting expenses each month?

\$0	8%
\$1 - \$20	8%
\$21 - \$40	8%
\$41 - \$60	0%
\$61 - \$80	8%
\$81 - \$100	23%
\$100 or more	38%
Don't know	8%
Total*	100%

* May not add to 100% due to rounding.



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Vehicle Trips, Daily Commute Mileage and Your Company's Associated Carbon Footprint

Results - For <u>YOUR COMPANY</u> and <u>A TYPICAL WORKSITE</u> of your size in your Region/County		
Current Vehicle Trips and Miles for employees		
	Your Company	Region Estimate
Current daily vehicle trips to and from your location	1,035	886
Current daily commute miles driven by your employees	17,008	13,917
Ozone Pollutant Emissions produced by employees		
	Your Company	Region Estimate
NOx - Oxides of Nitrogen (daily pounds)	18.8	15.3
VOC - Volatile Organic Compounds (daily pounds)	10.6	8.8
Greenhouse Gases produced by employees		
	Your Company	Region Estimate
CO2* (daily pounds)	19,125	15,265
* - CO2 "equivalent" emissions includes CO2 and other greenhouse gases		

Summary Highlights:

- On a daily basis, your employee commutes contribute 3,860 lbs. more than an average business of similar size in Fairfax County (or about 25% more daily GHG emissions).
- Over the course of a year, this adds up to 1,003,600 lbs. of additional GHG emissions.
- On average, your employee's daily commutes are more than 3,000 more miles than the employees of an average Fairfax business.



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Vehicle Trips

Vehicle Trips Eliminated

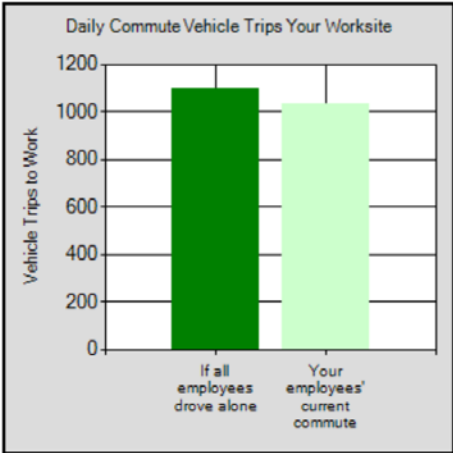
How many vehicle trips do employees remove from the roads?

- Daily vehicle trips to a typical worksite if all employees drove alone
- Current daily vehicle trips to a typical worksite

Your Company	Region Estimate
1,100	1,100
1,035	886

- One-way vehicle trips eliminated by employees each work day
- Percentage change in employees' daily vehicle trips
- Number of cars employees take off the road each day

Your Company	Region Estimate
65	214
-6%	-19%
32	107



In a year, your employees eliminate 16,158 one-way vehicle trips





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Miles of Travel

Vehicle Miles of Travel (VMT) Eliminated

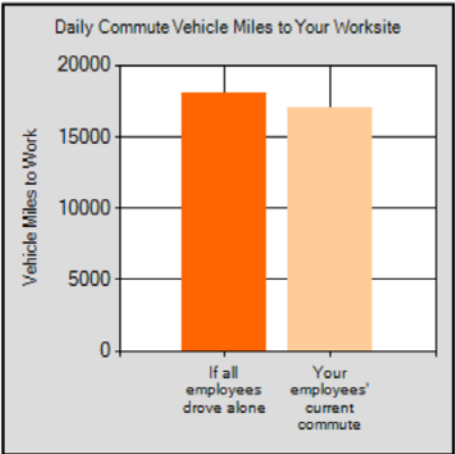
How many commute vehicle miles do employees eliminate?

- Daily commute vehicle miles to worksite if all employees drove alone
- Current daily vehicle miles to worksite

Your Company	Region Estimate
18,070	17,270
17,008	13,917

- Daily one-way vehicle miles eliminated
- Percentage of daily vehicle miles reduced

Your Company	Region Estimate
1,062	3,353
6%	19%



In a year, your employees eliminate 265,429 one-way vehicle miles





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Greenhouse Gas Emissions Eliminated

Ozone Pollutant Emissions Eliminated

How many pounds of emissions do employees eliminate?

- Daily ozone pollutant emissions produced if all employees drove alone

- NOx (Oxides of Nitrogen) in pounds

- VOC (Volatile Organic Compounds) in pounds

- CO2 equivalent emissions (CO2 plus other greenhouse gases) in pounds

Your Company	Region Estimate
19.7	18.8
11.1	10.8
20,049	18,837

- Current daily emissions produced by employees

- NOx (Oxides of Nitrogen) in pounds

- VOC (Volatile Organic Compounds) in pounds

- CO2 equivalent emissions (CO2 plus other greenhouse gases) in pounds

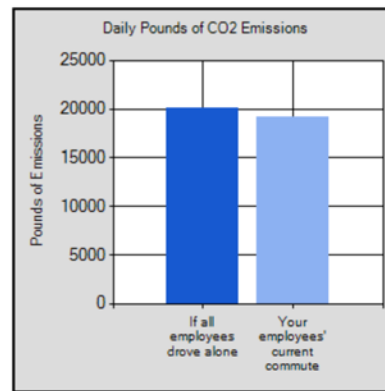
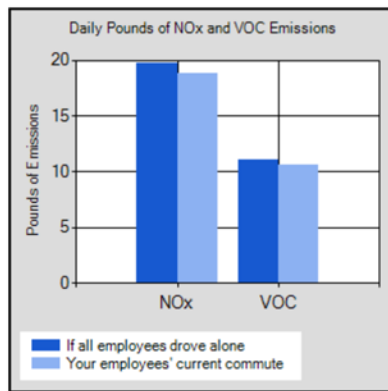
Your Company	Region Estimate
18.8	15.3
10.6	8.8
19,125	15,265

- Daily pounds of NOx eliminated

- Daily pounds of VOC eliminated

- Daily pounds of CO2 equivalents eliminated

Your Company	Region Estimate
0.9	3.5
0.5	2.0
924	3,572



In a year, your employees eliminate:

225 pounds of NOx

123 pounds of VOC

231,031 pounds of CO2



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GHG Emission Equivalents

In a year, the commute choices of your employees reduce 231,031 pounds of GHG emissions. This is equivalent to the GHG emissions of:

924,122 hours of desktop computer use⁽¹⁾

Heating water to make **6,979,774** cups of coffee⁽²⁾

30,822 hours of cell phone use⁽²⁾



Sources:

(1) <http://www.squidoo.com/Green-Computing>

(2) <http://www.guardian.co.uk/environment/green-living-blog/2010/jun/17/carbon-footprint-of-tea-coffee>



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Employee Comments From Survey

If there were vehicles available at work for use during meetings and site visits that could easily be borrowed, it would allow for leaving a personal vehicle at home

I may occasionally walk once the construction around INOVA Hospital is completed.

i would like to see more trains as a mode of transportation
Shower facilities at work would go a LONG way to encourage walking and bicycle commuting.

Teleworking would be favored by many of the staff I have talked to but is discouraged by the company/department. I would also like to work on a 4 day work week (4/10), but that too is discouraged. Allowing more 4/10 workers, flexible schedules, or teleworking would save money on facilities expenses (fewer people in office means need less office space - could also rent out space and actually make money), improve employee morale, and be good for environment. But, it has historically been discouraged by company / department. Because I live close to work, I would consider biking, but don't because there are no shower facilities available to normal staff (just survey crew and nursing mothers). Could also reduce carbon footprint by improving heating/cooling in building and implementing ways of cut back on waste - but that has historically not been seen as worth the effort by company / department.

I would ride my bicycle the 1.5 miles to work if there were bike lanes, wooded path, or it was safer to ride.

I have to drop my kids off at day care before I come to work which is one of the reasons why I don't consider alternate forms of

transportation. I do appreciate the option to telecommute and wish it were more widely available/available on a more regular basis. Metro buses are not very reliable with schedules. They can be improved.

Alternative work scheduling would be a great way to cut back on driving.
More varied and frequent bus routes

For workers at 8401 Arlington blvd, use of Metro rail requires also using Metro bus, which can be very inconvenient. Given the new development surrounding the office, consideration of a Metro shuttle shared by surrounding businesses should be given.

If there was a shower available I would biking to work.

My first choice of transportation would be mass transit, if it is convenient in terms of location and schedule.

I am the primary point of contact for child care. Even though I would try non-automobile means of transportation, I prefer having my own car, in case of an emergency. Also, around 8401 Arlington Blvd., sidewalks are not very visible to vehicular transport, and pedestrian crossings are dangerous.

The Acme office is situated within a high-transit part of the country, yet is not able to take advantage due to its long distance from the metro stop. If you are carrying a laptop, are in a hurry for a meeting, or weather is bad, you do not want to be making that walk. I've commuted via MARC train before but my distance to Acme that way involved 2 hours in transit. Driving is only 1.5 in good traffic.